



# Presentation of Coronary Artery Disease in a Chiropractic Clinic: A Report of 2 Cases



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Received 17 September 2015; received in revised form 20 December 2015; accepted 28 December 2015

## Key indexing terms:

Coronary artery disease;  
Chest pain;  
Chiropractic;  
Musculoskeletal pain

## Abstract

**Objective:** The purpose of this report is to describe 2 patients with coronary artery disease presenting with musculoskeletal symptoms to a chiropractic clinic.

**Clinical Features:** A 48-year-old male new patient had thoracic spine pain aggravated by physical exertion. A 61-year-old man under routine care for low back pain experienced a secondary complaint of acute chest pain during a reevaluation.

**Intervention and Outcome:** In both cases, the patients were strongly encouraged to consult their medical physician and were subsequently diagnosed with coronary artery disease. Following their diagnoses, each patient underwent surgical angioplasty procedures with stenting.

**Conclusion:** Patients may present for chiropractic care with what appears to be musculoskeletal chest pain when the pain may be generating from coronary artery disease necessitating medical and possibly emergency care.

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## Introduction

Chest pain is a common complaint in all health care settings.<sup>1</sup> Chest pain has a lifetime prevalence of 20%–40% in the general population, and in the primary care setting, it accounts for 1%–2% of all patient visits.<sup>2</sup> Chest pain raises concerns about the occurrences of serious conditions such as coronary heart disease. Coronary heart disease is present in approximately 12% of primary care patients with chest pain.<sup>2,3</sup> In spite of this, the clinical recognition of coronary artery disease

among patients who report chest pain remains difficult in this environment.<sup>4</sup> Acute chest pain accounts for 5%–6% of all admissions to emergency departments in both Europe and the United States,<sup>5,6</sup> and acute coronary syndrome accounts for 20%–25% of these cases. Another 50% of acute chest pain admissions are for non–cardiac-related reasons<sup>7</sup>; and in acute chest pain clinics, musculoskeletal chest pain accounts for between 5% and 20% of total visits.<sup>8–10</sup>

Chest pain of a serious cardiovascular concern, for example, myocardial infarction and acute coronary syndrome, is seen less often in the primary care setting than in the emergency care setting.<sup>11</sup>

Chest pain presentations in chiropractic clinics may be of a musculoskeletal origin.

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The natural history and degree of symptom turnover in musculoskeletal chest pain are however poorly understood.<sup>12</sup> Symptoms of musculoskeletal chest pain may present in cardiovascular and other chest pain pathologies. For example, Robson et al<sup>4</sup> found that 10% of all patients with coronary artery disease symptoms presented with at least 1 musculoskeletal complaint. Chiropractic physicians should carefully assess and monitor patients who present with acute musculoskeletal chest complaints until nonmusculoskeletal and cardiac-related causes are excluded.

Patients with thoracic spine pain complaints may also have underlying cardiac pathology. Thoracic spine pain is a common musculoskeletal presentation in both clinical practice and the general population, with the 7-day and 1-year prevalence periods of thoracic spine being reported as 25.8% and 22.6% respectively.<sup>13</sup> Thoracic spine pain may arise from a number of sources including the thoracic and cervical spine; the thorax; and gastrointestinal, cardiopulmonary, and renal systems.<sup>14,15</sup> It is clinically important for the chiropractic physician to be aware of these potential differential diagnoses when proceeding with patient care. The purpose of this report is to describe the presentation of 2 patients who initially presented with musculoskeletal chest pain but who had coronary artery disease.

## Case Report

### Case 1

An active 48-year-old healthy man presented with exercise-induced back pain. He reported no history of tobacco use. He had previous success with chiropractic for spine-related conditions. In this episode of pain, he was having brief attacks of sharp mid-to-lower thoracic spine and rib pain that was brought on by 10 to 15 minutes of vigorous cardiovascular exercise. During an attack, the intensity of the pain would force him to stop and rest.

Clinical assessment revealed an unremarkable neurological screen which consisted of testing deep tendon reflexes, dermatomes, myotomes, long tract signs, and balance. However, active and passive left lateral thoracic spine flexion provoked the patient's unspecific thorax pain. Other ranges of motion and provocation tests were unremarkable. Prone thoracic spine palpation and applied posterior-to-anterior pressure challenges produced generalized segmental and musculoskeletal pain at the patient's T2-3 and T6-T10

vertebral segments. Muscle soreness was palpated in the left inferiolateral latissimus dorsi muscle fibers and bilaterally along the paraspinals at the T7-T10 spinal levels. Manual palpation of the patient's anterior chest wall did not reproduce any pain. Based on these findings, an initial clinical impression of mechanical thoracic spine pain was communicated to the patient, and a manual therapy plan of management was initiated. In addition to mechanical thoracic spine pain, other differential diagnoses considered were (a) referred gallbladder and/or liver pathology, (b) heart or lung pathology, and (c) costochondritis.

After 4 treatment sessions over 2 weeks focusing on thoracic spine manipulation/mobilization and soft tissue therapy, the patient experienced mild subjective improvements. At the fourth visit to the chiropractic office, the patient reported that he had another attack of midback pain during vigorous cardiovascular exercise requiring him to stop and rest. At this point, the chiropractic physician encouraged the patient to consult with his medical physician for further investigation and cardiac assessment. The patient did not follow through on this recommendation and continued with his normal active lifestyle. On the fifth visit (at 2½ weeks), the patient's midback symptoms and palpatory findings had improved overall; nevertheless, he was anxious about the possibility of underlying heart disease. His blood pressure was taken in the chiropractic office and measured as elevated at 145/95. His radial pulse was strong and rapid, whereas cardiac auscultation was normal. On the advice of his chiropractor, he immediately made an appointment with his physician.

One week later the patient, returned to the chiropractic clinic and reported having had blood work taken and that an echocardiogram was scheduled to be taken. The echocardiogram demonstrated that the patient had partial coronary arterial occlusions. One month later, he underwent surgical angioplasty, and 2 stents were implanted to relieve a 95% occluded interventricular branch and a 75% occluded left descending coronary artery. Once the patient was stable, he began an outpatient cardiac rehabilitation program, and 3 months later, he reported to the chiropractor complete resolution of his chest pain.

### Case 2

A 61-year-old man presented to the chiropractic office for a follow-up visit for low back pain treatment. The patient reported a new secondary complaint of acute pain in his central chest located below his sternum and xiphoid process. The patient's health

history included heavy smoking more than 20 years earlier. His medical history included a moderate abdominal aortic calcification as seen on previous lumbar spine radiographs and hypertension. The character of the patient's current chest pain was described as a constant strong pressure with a well-defined cylindrical shape, "like a soup can being forced against his chest wall." Belching temporarily relieved his symptoms, which he demonstrated, and this led him to believe he was experiencing indigestion. He reported that he regularly exercised on a stationary bicycle for 30 minutes to an hour without exacerbation of his symptoms. Based on the patient's present chest symptoms and medical history, the chiropractic physician strongly encouraged the patient to consult with his medical physician for follow-up and cardiac evaluation. The patient hesitated and did not consult with his medical physician.

Three weeks later, while relaxing at home, he experienced 3 attacks of progressively worsening acute chest pain that prompted him to call for an ambulance. At the hospital, he was diagnosed with acute coronary syndrome, with a 90% occlusion of the distal right coronary artery, 30% occlusion of the medial right coronary artery, and 40% occlusion of the proximal right coronary artery. Angioplasty was performed, and a stent was implanted at the distal right coronary artery occlusion. Cardiac rehabilitation was initiated once the patient was stable and was ongoing at the time of this report. The chiropractor continues to see this patient for low back pain, and the patient reports that his chest pain is resolved.

## Discussion

This case report highlights the role chiropractors have in helping with the diagnosis and management of patients with chest pain of cardiovascular origin. Important first steps in the evaluation of patients with chest pain are the history and physical examination.<sup>1</sup> Clinicians can identify patients in need of further investigations with a thorough history and physical examination, helping to protect patients from potentially harmful and unnecessary testing while minimizing health care expenses. In primary contact settings, such as the chiropractic clinic, the history and physical examination remain the practitioner's main diagnostic tools.

Making a cardiovascular diagnosis is multifactorial, and a single risk factor, sign, or symptom will have poor diagnostic ability at detecting the disease.<sup>16,17</sup> There are

additional clinical factors in cardiovascular disorders, such as sex differences, that can also affect the clinical presentation. For example, women may present with a different intensity of chest pain symptoms, fatigue, and/or shortness of breath than would be typically expected of men. Some of the most common chest pain descriptors and clinical characteristics reported by patients and health care providers are displayed in Fig 1. In addition to cardiovascular etiology, there are further differential diagnoses that need to be considered in chest pain patients when establishing the correct diagnosis in a primary care setting. These include pulmonary, musculoskeletal, gastrointestinal, dermatologic, and psychiatric disorders.<sup>4</sup> Regardless, it is essential for clinicians to first eliminate life-threatening disease (eg, acute coronary syndrome, pulmonary embolism, tension pneumothorax, and aortic dissection) as part of the diagnostic workup before proceeding with patient care.

Risk factors of cardiovascular disease classically include male sex, age, a history of smoking, obesity, and menopause.<sup>1</sup> A medical history of diabetes mellitus, dyslipidemia, hypertension, previous coronary artery disease, myocardial infarction, and angina pectoris, and a family history of heart disease are additional classical risk factors.<sup>1,18</sup> Other symptoms that may be associated with chest pain include diaphoresis, dyspnea, nausea/vomiting, dizziness, syncope or collapse, palpitation, weakness, fear, and anxiety.<sup>16</sup> Physical signs that are indicative of cardiovascular disease and that are measurable in a clinical setting include elevated blood pressure, tachycardia, bradycardia, and rales.<sup>1,4</sup>

Validated clinical prediction rules can be particularly helpful for clinicians in determining the presence or absence of disease. In patients with chest pain, a

Location of Pain:	
•	Central Chest
•	Left Chest
•	Right Chest
Radiation of Pain to:	
•	Left Arm/Shoulder
•	Right Arm/Shoulder
•	Back
<b>Visceral Pain</b>	
<b>Stabbing Pain</b>	
<b>Burning Pain</b>	
<b>Pain Relieved by Nitro-Glycerine</b>	
<b>Pain Associated with Breathing</b>	
<b>Pain Associated with Exercise</b>	

**Fig 1.** Common chest pain descriptions and clinical characteristics.

primary care clinical prediction rule specifically for coronary artery disease has been established.<sup>17</sup> The components of this prediction rule include (a) age/sex (female  $\geq 65$ , male  $\geq 55$ ), (b) known clinical vascular disease, (c) pain symptoms exacerbated during exercise, (d) pain that is not reproduced with palpation, and (e) the patients assume that their chest pain is of a cardiac origin. The more components of the prediction rule that are present, the more likely that the patient has coronary artery disease, with 3/5 providing the best discrimination, having a sensitivity of 87.1%. For example, in this report, case 1 scored 2/5 and case 2 scored 3/5 on the prediction rule, respectively, predicting that the patient in case 2 had a higher likelihood of having coronary artery disease.

Another validated prediction tool, the QRisk2 (Cardiovascular Disease Risk Algorithm) questionnaire, can be used in the assessment of long-term general cardiovascular risk in asymptomatic primary care patients.<sup>18</sup>

Generally, chest pain that lasts longer than 60 minutes is very atypical for angina and more indicative of acute myocardial infarction.<sup>19</sup> As such, chest pain presenting in the clinical setting that is lasting longer than 60 minutes may require immediate emergency medical referral for diagnostic workup, treatment, or monitoring. Neither patient in this study had chest pain episodes lasting longer than 60 minutes. It is important to differentiate specific acute coronary syndromes from severe or benign causes of chest pain as the consequences of a misdiagnosis can be drastic.<sup>16</sup> On the other hand, inadequate assessment and management of patients with suspected acute coronary syndrome can lead to inappropriate and harmful investigations as well as higher costs. Alternatively, patients with a cardiovascular event that are misdiagnosed may continue to be untreated.

Musculoskeletal chest pain accounts for many admissions to hospital,<sup>8</sup> and its natural history is poorly understood.<sup>11</sup> Serious pathologies including coronary artery disease can have similar symptom presentation to musculoskeletal chest pain, making a clear diagnosis challenging.<sup>16</sup> Several studies have found chest pain of musculoskeletal etiology to be the most frequent presentation in chest pain clinics.<sup>4,16,20–22</sup> Diagnostically, musculoskeletal chest pain can be reproduced with arm or neck movement.<sup>23</sup> However, as with case 1 in this study, the patient's symptoms could be reproduced with thoracic spine movements, which is a sign inconsistent of cardiovascular origin. It is possible that left lateral thoracic flexion may have caused compression of the thoracic wall on this side, leading

to further compression and irritation of an already compromised heart. It is also possible that the patient was experiencing secondary musculoskeletal symptoms not associated with the coronary artery disease. Musculoskeletal chest pain does not require emergency medical attention. However, if there is central chest pain with radiation to either or both shoulders and arms, this may signal an emergency situation requiring referral of the patient to an acute care clinic.<sup>4</sup> The patient in case 2 had central chest pain but no shoulder or arm radiation. Other common differential diagnoses for musculoskeletal-related chest pain include thoracic spine pain, costovertebral joint pain, costochondritis, costosternal syndrome, sternalis syndrome, Tietze syndrome, rib-tip syndrome, and xiphoidalgia.<sup>24–30</sup>

Musculoskeletal chest pain originates from the bony and soft tissue structures of the chest wall.<sup>11</sup> Functionally, the chest wall is a complex system that provides rigid protection to the vital organs and stability to the arm and shoulder, and offers flexibility to aid in respiration.<sup>31</sup> Anatomically, the chest wall structure is comprised of the spine, ribs, and sternum, including all of the various joints, ligaments, and related muscles.<sup>11</sup> Because of this functional and anatomical complexity, the morphological and physiological basis of chest wall dysfunctions can remain obscure in the clinical setting. Chest wall syndrome<sup>11</sup> is used to describe these musculoskeletal chest and rib pain presentations.

Both patients in this study had coronary artery stenting procedures after being referred from the chiropractic clinic to their respective physicians. Percutaneous coronary intervention, or angioplasty, is a common surgical procedure performed for coronary revascularization in patients with stable angina or acute coronary syndromes.<sup>32</sup> During this procedure, a stent is often placed at the site of blockage to permanently open the artery.<sup>32</sup> The primary complications that can occur after stent implantation are in-stent restenosis and stent thrombosis. The risk for stent thrombosis is highest within the first 30 days after stenting.<sup>33</sup> To reduce the risk of stent thrombosis, dual antiplatelet therapy is currently recommended for all patients undergoing coronary stent procedures.<sup>33</sup> Indefinite use of low-dose aspirin is also recommended after angioplasty.<sup>33,34</sup> Because of the reported association between vertebral artery dissection (or stroke) and visits to medical/or chiropractic physicians,<sup>35</sup> manual therapists need to be clinically aware of the aforementioned thrombosis risk when working with patients post angioplasty/stenting.

Chiropractors commonly treat patients after medical cardiovascular interventions. For example, Prasad et al<sup>36</sup>



found that 31.5% of all cardiovascular outpatients surveyed indicated that they used chiropractic therapy. The most common heart-related symptoms, for which the patients reported using chiropractic as well as other Complementary and Alternative Medicine (CAM) treatments, were shortness of breath, palpitations, chest pain, dizziness, and leg swelling. Among the patients with coronary artery disease, the greatest benefit was reported for chest pain (20.0%), sleep disturbance (17.9%), leg swelling (17.9%), and shortness of breath (13.9%). These perceived improvements were reported in approximately 1 in 5 patients using chiropractic and other CAM therapies. These findings suggest that chiropractic and other CAM therapies may complement the treatment of CVD symptoms in addition to standard medical therapy or in cases in which drug adverse effects are not tolerable. Of interest, only 135 of the respondents (14.4%) in this study reported discussing the use of alternative treatments with their physician.

Undifferentiated chest pains from musculoskeletal sources are often overlooked.<sup>37,38</sup> A large proportion of patients with chest pain who are admitted to hospital do not turn out to have acute coronary syndrome.<sup>39</sup> Distinguishing whether a patient presenting with chest pain has acute coronary syndrome or a nonacute coronary syndrome is at best difficult. Undiagnosed chest pain patients on emergency medical admission are commonly discharged.<sup>8</sup> The absence of a firm diagnosis for chest pain can result in depression, anxiety, and a decrease in daily activity.<sup>40</sup> Such reactions have been ascribed directly to the absence of reassurance that symptoms do not indicate life-threatening disease.<sup>41</sup> The lack of a definitive diagnosis can also lead to inappropriate investigations and management, with further anxiety and time lost from work.<sup>42</sup> Stockkendahl et al (2008)<sup>43</sup> suggest that a chiropractor may be able to identify and triage a subset of patients with chest pain predominantly of musculoskeletal origin among patients who are discharged from acute chest pain clinics with no apparent cardiac condition. The current study also demonstrates that a chiropractor may assist in the diagnoses of patients who are experiencing cardiac-related chest pain, not just noncardiac chest pain as in the former study. Preliminarily, several case reports are also indicating that chiropractic treatment may be beneficial in patients with undifferentiated chest pain.<sup>44,45</sup>

### Limitations

The limitations of this study include that it is a case study. Case studies do not address causality and are

limited with respect to their generalizability. In addition, further patient clinical information could have been gathered such as repeat blood pressure measures, heart rate, and heart auscultation; also, acquiring the reports from blood work tests, echocardiograms, and other investigations ordered by the respective physicians would have provided greater detail.

### Conclusion

This report describes the management of 2 patients with undiagnosed acute coronary artery disease who presented to a chiropractic clinic. Although acute coronary disease may be an infrequent presentation in a chiropractic clinical setting, musculoskeletal-related chest pain presentations are not uncommon. To the treating clinician, coronary artery disease may initially mimic musculoskeletal symptoms or, as described in the second case in this study, present as a secondary complaint during routine musculoskeletal care follow-up. It is imperative that clinicians direct patients to the appropriate primary care centers when there is a suspicion of urgently needed management of potentially life-threatening conditions, such as in acute cardiovascular disease.

### Funding Sources and Conflicts of Interest

No funding sources or conflicts of interest were reported for this study.

### Acknowledgment

The author thanks Dr Peter Emary for feedback while drafting this manuscript.

### Practical Applications

- Musculoskeletal chest pain may be a clinical presentation in a chiropractic setting.
- Coronary artery disease can resemble musculoskeletal-related chest pain.
- Musculoskeletal specialists can play an important role in the early detection of musculoskeletal and nonmusculoskeletal chest pain.

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